

Ap Bio Unit 3

Cheatography

AP Bio Unit 3: Cellular Energetics Cheat Sheet
by PrincessB3IG via cheatography.com/122525/cs/22782/

Enzymes

Enzymes: biological catalysts that facilitate chemical rxns in cells by lowering the activation energy

Structure:

- Active site that specifically interacts with substrate molecules

- Shape and charge of the substrate must be compatible with the active site of the enzyme

Environmental Impacts:

Denaturation: protein structure is disrupted, eliminating the ability to catalyze rxns

- Environmental temperatures and pH outside the optimal range will cause structural changes

a. pH change can alter H-bonds that provide enzyme structure

b. H temp increases speed of molecules in a solution, increasing frequency of collisions between enzymes and substrates (increase rate of rxn)

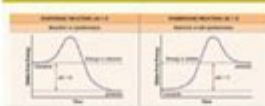
- Relative concentrations of substrates and products determine how efficient rxn is

Inhibitors:

- Competitive inhibitor molecules can bind reversibly or irreversibly to the active site of enzyme

- Noncompetitive inhibitors can bind allosteric sites, changing the activity of the enzyme

Endergonic vs. Exergonic



Thermodynamics

1st Nrg cannot be created nor destroyed
Law only transferred

2nd every nrg transfer increases entropy
Law (S) of universe; process must increase entropy to be spontaneous

- Energy input must exceed energy loss to maintain order and to power cellular processes

- Cellular processes that release energy may be coupled with cellular processes that require energy

a. Often sequential; product of rxn is reactant for next step

- Loss of order or energy flow results in death

- Living systems require constant nrg input

Cofactor vs. Coenzyme

Cofactor Inorganic; Cu, Zn, Mg, Fe, Ca ions; Remove electrons, protons or chemical groups from substrate

Coenzyme Organic (non-protein); NAD⁺, FAD⁺, vitamin complexes; Remove electrons from substrate and transfer to other molecules

Both aid in proper functioning of enzyme

Fitness

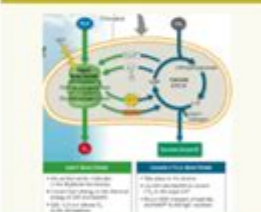
- Variation at the molecular level provides organisms with ability to respond to various environmental stimuli

- Variation in the number and types of molecules within cells provide organisms with greater ability to survive and/or reproduce in different environments

Cellular Respiration



Photosynthesis



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AP Bio Unit 3: Mastering Cellular Energetics and Photosynthesis

Conquering AP Biology can feel like scaling a mountain, but with the right strategy and resources, you can summit successfully. Unit 3, focusing on cellular energetics and photosynthesis, is a crucial step on that journey. This comprehensive guide breaks down AP Bio Unit 3, providing you with everything you need to master this challenging yet fascinating unit. We'll cover key concepts, helpful

study tips, and address common student questions, ensuring you're well-prepared for the exam. Let's dive into the energy-packed world of cellular respiration and photosynthesis!

Understanding Cellular Respiration: The Energy Powerhouse

Cellular respiration is the process by which cells break down glucose to produce ATP (adenosine triphosphate), the cell's primary energy currency. This intricate process is crucial for all life forms. Understanding the nuances of cellular respiration is paramount for success in AP Bio Unit 3.

Glycolysis: The First Step

Glycolysis, the initial stage of cellular respiration, occurs in the cytoplasm and doesn't require oxygen. It involves a series of enzymatic reactions that break down glucose into pyruvate, yielding a small amount of ATP and NADH (an electron carrier). Understanding the net gain of ATP and NADH is crucial.

The Krebs Cycle (Citric Acid Cycle): Extracting More Energy

Following glycolysis, pyruvate enters the mitochondria and is converted into acetyl-CoA, initiating the Krebs cycle. This cyclical pathway further breaks down pyruvate, generating more ATP, NADH, FADH₂ (another electron carrier), and CO₂. Focusing on the products and the role of coenzymes is vital.

Oxidative Phosphorylation: The Electron Transport Chain and Chemiosmosis

Oxidative phosphorylation, the final stage, takes place in the inner mitochondrial membrane. Electrons from NADH and FADH₂ are passed down the electron transport chain, creating a proton gradient across the membrane. This gradient drives chemiosmosis, a process that generates a large amount of ATP via ATP synthase. Understanding the role of oxygen as the final electron acceptor is key. This process is highly efficient, producing the vast majority of ATP from cellular respiration.

Photosynthesis: Capturing Solar Energy

Photosynthesis, the process by which plants and some other organisms convert light energy into chemical energy, is closely intertwined with cellular respiration. Understanding the similarities and differences between these two processes is a critical aspect of AP Bio Unit 3.

Light-Dependent Reactions: Harvesting Light Energy

The light-dependent reactions occur in the thylakoid membranes of chloroplasts. Chlorophyll and other pigments absorb light energy, exciting electrons and initiating a series of electron transport chains. This process generates ATP and NADPH, which are used in the subsequent light-independent reactions. Mastering the Z-scheme and photolysis (water splitting) is essential.

Light-Independent Reactions (Calvin Cycle): Building Sugars

The light-independent reactions, or Calvin cycle, occur in the stroma of chloroplasts. ATP and NADPH generated during the light-dependent reactions are used to convert CO₂ into glucose. This process, also known as carbon fixation, is a cyclical pathway involving several enzyme-catalyzed reactions. Understanding the role of RuBisCO and the three phases of the Calvin cycle is crucial.

Connecting Cellular Respiration and Photosynthesis

It's essential to understand the interconnectedness of cellular respiration and photosynthesis. Photosynthesis produces glucose and oxygen, which are used in cellular respiration. Cellular respiration produces CO₂ and water, which are used in photosynthesis. This cyclical relationship is fundamental to the flow of energy in ecosystems.

Study Tips for AP Bio Unit 3

Visual Aids: Use diagrams and flowcharts to visualize the complex processes of cellular respiration and photosynthesis.

Practice Problems: Work through numerous practice problems to solidify your understanding of the concepts.

Flashcards: Create flashcards to memorize key terms, definitions, and processes.

Group Study: Collaborate with classmates to discuss challenging concepts and quiz each other.

Review Sessions: Schedule regular review sessions to reinforce your knowledge.

Conclusion

Mastering AP Bio Unit 3 requires a thorough understanding of cellular respiration and photosynthesis. By focusing on the key concepts, utilizing effective study strategies, and practicing consistently, you can build a solid foundation and confidently approach the exam. Remember to connect the processes and understand their interconnected roles in energy flow within biological systems.

FAQs

1. What is the difference between aerobic and anaerobic respiration? Aerobic respiration requires

oxygen as the final electron acceptor, while anaerobic respiration utilizes other molecules like sulfate or nitrate. Aerobic respiration produces significantly more ATP.

2. What is the role of ATP synthase? ATP synthase is an enzyme that uses the proton gradient generated during oxidative phosphorylation to synthesize ATP from ADP and inorganic phosphate.

3. How does photosynthesis contribute to global carbon cycling? Photosynthesis removes CO₂ from the atmosphere and incorporates it into organic molecules, playing a crucial role in regulating atmospheric CO₂ levels.

4. What are the different types of photosynthetic pigments? Chlorophyll a and b are the primary pigments, while carotenoids and phycobilins are accessory pigments that absorb light at different wavelengths.

5. How do environmental factors affect photosynthesis rates? Factors like light intensity, temperature, CO₂ concentration, and water availability all influence the rate of photosynthesis. Optimal conditions maximize the process's efficiency.

ap bio unit 3: Biology for AP® Courses Julianne Zedalis, John Eggebrecht, 2017-10-16 Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

ap bio unit 3: Princeton Review AP European History Premium Prep, 2022 The Princeton Review, 2021-08-03 Make sure you're studying with the most up-to-date prep materials! Look for the newest edition of this title, The Princeton Review AP European History Premium Prep, 2023 (ISBN: 9780593450796, on-sale September 2022). Publisher's Note: Products purchased from third-party sellers are not guaranteed by the publisher for quality or authenticity, and may not include access to online tests or materials included with the original product.

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ensures better learning and a more stimulating experience for students and teachers alike.

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ap bio unit 3: Princeton Review AP Psychology Premium Prep, 2022 The Princeton Review, 2021-08-03 Make sure you're studying with the most up-to-date prep materials! Look for the newest edition of this title, *The Princeton Review AP Psychology Premium Prep, 2023* (ISBN: 9780593450871, on-sale August 2022). Publisher's Note: Products purchased from third-party sellers are not guaranteed by the publisher for quality or authenticity, and may not include access to online tests or materials included with the original product.

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use of biomacromolecules as nutraceuticals, antioxidants, antimicrobials, anticancer agents, and antidiabetics, among others. The third section of the book focuses on specific applications of biomacromolecules, ranging from drug delivery and wound management to tissue engineering and enzyme immobilization. This focus on the various practical uses of biological macromolecules provide an interdisciplinary assessment of their function in practice. The final section explores the key challenges and future perspectives on biological macromolecules in biomedicine. - Covers a variety of different biomacromolecules, including carbohydrates, lipids, proteins, and nucleic acids in plants, fungi, animals, and microbiological resources - Discusses a range of applicable areas where biomacromolecules play a significant role, such as drug delivery, wound management, and regenerative medicine - Includes a detailed overview of biomacromolecule bioactivity and properties - Features chapters on research challenges, evolving applications, and future perspectives

ap bio unit 3: Preparing for the Biology AP Exam Neil A. Campbell, Jane B. Reece, Fred W. Holtzclaw, Theresa Knapp Holtzclaw, 2009-11-03 Fred and Theresa Holtzclaw bring over 40 years of AP Biology teaching experience to this student manual. Drawing on their rich experience as readers and faculty consultants to the College Board and their participation on the AP Test Development Committee, the Holtzclaws have designed their resource to help your students prepare for the AP Exam. Completely revised to match the new 8th edition of Biology by Campbell and Reece. New Must Know sections in each chapter focus student attention on major concepts. Study tips, information organization ideas and misconception warnings are interwoven throughout. New section reviewing the 12 required AP labs. Sample practice exams. The secret to success on the AP Biology exam is to understand what you must know and these experienced AP teachers will guide your students toward top scores!

ap bio unit 3: Biology : the unity and diversity of life Cecie Starr, 2008-09-01 By using an issues-oriented approach, the new edition of this respected text grabs student interest with real-life issues that hit home. This text includes new coverage and pedagogy that encourages students to think critically about hot-button issues and includes outstanding new features that take students beyond memorization and encourage them to ask questions in new ways as they learn to interpret data. Show students how biology matters – Biology's connections to real life are reflected in every chapter of this new edition, beginning with opening Impacts, Issues essays—a brief case study on a biology-related issue or research finding and is revisited throughout the chapter, reminding students of the real-world significance of basic concepts. Additional, online exercises promote critical thinking about issues students will face as consumers, parents, and citizens. Link concepts from chapter to chapter – Links to Earlier Concepts appear near the Key Concepts, to help students remember what they've learned in earlier chapters and apply it to the new material to come. At the beginning of each section, students are reminded of the earlier link that is most appropriate for their current study.

ap bio unit 3: Emergency Response Guidebook U.S. Department of Transportation, 2013-06-03 Does the identification number 60 indicate a toxic substance or a flammable solid, in the molten state at an elevated temperature? Does the identification number 1035 indicate ethane or butane? What is the difference between natural gas transmission pipelines and natural gas distribution pipelines? If you came upon an overturned truck on the highway that was leaking, would you be able to identify if it was hazardous and know what steps to take? Questions like these and more are answered in the Emergency Response Guidebook. Learn how to identify symbols for and vehicles carrying toxic, flammable, explosive, radioactive, or otherwise harmful substances and how to respond once an incident involving those substances has been identified. Always be prepared in situations that are unfamiliar and dangerous and know how to rectify them. Keeping this guide around at all times will ensure that, if you were to come upon a transportation situation involving hazardous substances or dangerous goods, you will be able to help keep others and yourself out of danger. With color-coded pages for quick and easy reference, this is the official manual used by first responders in the United States and Canada for transportation incidents involving dangerous goods or hazardous materials.

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ap bio unit 3: AP Biology Premium Deborah T. Goldberg, 2020-06-19 Be prepared for exam day with Barron's. Trusted content from AP experts! Barron's AP Biology Premium: 2020-2021 includes in-depth content review and online practice. It's the only book you'll need to be prepared for exam day. Written by Experienced Educators Learn from Barron's--all content is written and reviewed by AP experts Build your understanding with comprehensive review tailored to the most recent exam Get a leg up with tips, strategies, and study advice for exam day--it's like having a trusted tutor by your side Be Confident on Exam Day Sharpen your test-taking skills with 5 full-length practice tests--2 in the book and 3 more online Strengthen your knowledge with in-depth review covering all Units on the AP Biology Exam Reinforce your learning with practice questions at the end of each chapter Interactive Online Practice Continue your practice with 3 full-length practice tests on Barron's Online Learning Hub Simulate the exam experience with a timed test option Deepen your understanding with detailed answer explanations and expert advice Gain confidence with automated scoring to check your learning progress

ap bio unit 3: Molecular Biology David P. Clark, Nanette J. Pazdernik, 2012-03-20 Molecular Biology, Second Edition, examines the basic concepts of molecular biology while incorporating primary literature from today's leading researchers. This updated edition includes Focuses on Relevant Research sections that integrate primary literature from Cell Press and focus on helping the student learn how to read and understand research to prepare them for the scientific world. The new Academic Cell Study Guide features all the articles from the text with concurrent case studies to help students build foundations in the content while allowing them to make the appropriate connections to the text. Animations provided deal with topics such as protein purification, transcription, splicing reactions, cell division and DNA replication and SDS-PAGE. The text also includes updated chapters on Genomics and Systems Biology, Proteomics, Bacterial Genetics and Molecular Evolution and RNA. An updated ancillary package includes flashcards, online self quizzing, references with links to outside content and PowerPoint slides with images. This text is designed for undergraduate students taking a course in Molecular Biology and upper-level students studying Cell Biology, Microbiology, Genetics, Biology, Pharmacology, Biotechnology, Biochemistry, and Agriculture. - NEW: Focus On Relevant Research sections integrate primary literature from Cell Press and focus on helping the student learn how to read and understand research to prepare them for the scientific world - NEW: Academic Cell Study Guide features all articles from the text with concurrent case studies to help students build foundations in the content while allowing them to make the appropriate connections to the text - NEW: Animations provided include topics in protein purification, transcription, splicing reactions, cell division and DNA replication and SDS-PAGE - Updated chapters on Genomics and Systems Biology, Proteomics, Bacterial Genetics and Molecular Evolution and RNA - Updated ancillary package includes flashcards, online self quizzing, references with links to outside content and PowerPoint slides with images - Fully revised art program

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theory. Penguin Biology is an invaluable reference for ornithologists, animal behaviorists, animal physiologists, marine zoologists, marine ecologists, evolutionary biologists, and Antarctic researchers. - Major topics covered include Breeding, feeding, and foraging - Behavior and evolution - Energetics and physiology - New fossil material

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investigates factors that influence a high school laboratory experience, looking closely at what currently takes place and what the goals of those experiences are and should be. Science educators, school administrators, policy makers, and parents will all benefit from a better understanding of the need for laboratory experiences to be an integral part of the science curriculum-and how that can be accomplished.

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ap bio unit 3: A Plain English Guide to the EPA Part 503 Biosolids Rule , 1994

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at the end of each chapter encourage students to assess their mastery of a given concept. & New Inquiry Figures focus students on the experimental process, and new Research Method Figures illustrate important techniques in biology. Each chapter ends with a Scientific Inquiry Question that asks students to apply scientific investigation skills to the content of the chapter.

ap bio unit 3: Importing Into the United States U. S. Customs and Border Protection, 2015-10-12 Explains process of importing goods into the U.S., including informed compliance, invoices, duty assessments, classification and value, marking requirements, etc.

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ap bio unit 3: Biology for NGSS. , 2016 Biology for NGSS has been specifically written to meet the high school life science requirements of the Next Generation Science Standards (NGSS).--Back cover.

ap bio unit 3: Principles of Biology Lisa Bartee, Walter Shiner, Catherine Creech, 2017 The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research.

ap bio unit 3: Pre-mRNA Processing Angus I. Lamond, 2014-08-23 In the past fifteen years have seen tremendous growth in our understanding of the many post-transcriptional processing steps involved in producing functional eukaryotic mRNA from primary gene transcripts (pre-mRNA). New processing reactions, such as splicing and RNA editing, have been discovered and detailed biochemical and genetic studies continue to yield important new insights into the reaction mechanisms and molecular interactions involved. It is now apparent that regulation of RNA processing plays a significant role in the control of gene expression and development. An increased understanding of RNA processing mechanisms has also proved to be of considerable clinical importance in the pathology of inherited disease and viral infection. This volume seeks to review the rapid progress being made in the study of how mRNA precursors are processed into mRNA and to convey the broad scope of the RNA field and its relevance to other areas of cell biology and medicine. Since one of the major themes of RNA processing is the recognition of specific RNA

sequences and structures by protein factors, we begin with reviews of RNA-protein interactions. In chapter 1 David Lilley presents an overview of RNA structure and illustrates how the structural features of RNA molecules are exploited for specific recognition by protein, while in chapter 2 Maurice Swanson discusses the structure and function of the large family of hnRNP proteins that bind to pre-mRNA. The next four chapters focus on pre-mRNA splicing.

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